

UNITED STATES GOVERNMENT

Memorandum

DJ
McCoy

TO : Distribution

DATE: 14 June 1967

FROM : Acting Apollo Program Manager, DA

SUBJECT: KSC Identification for Traceability

Reference: TWX, Same Subject, dated 2/14/67, from NASA Hdqrs. to KSC

The Apollo Program Director has requested all center program offices to require their prime contractors and subcontractors to review their procedures governing identification and control of critical material with the objective of establishing more stringent controls. This action is to ensure that only conforming material is used in Apollo hardware and that adequate "parts traceability" is maintained to enable defective material to be located expeditiously within the system should some problem arise. In addition, present inspection plans are to be re-evaluated to assure that material is verified as to identification and traceability prior to fabrication/assembly, and that post-inspection procedures for fabrication/test articles will ensure that all contractual requirements have been met.

The attached KSC Apollo Program Directive No. 12 defines the requirements for establishing and implementing an Identification for Traceability (I/T) Program. This program will enable compliance with the Apollo Reliability and Quality Assurance Program Plan, NHB 5300.1A, the quality provisions of NPC 200-2, inspection systems of NPC 200-3, and configuration provisions of NPC 500-1, and be consistent with the logistics provisions of NHB 7500.1 for Apollo space systems and related equipment. These requirements are applicable to KSC contractors, subcontractors, and suppliers involved in the Apollo Program. Provisions shall be made to require identification for traceability in affected contracts if not presently included.

Each affected organization shall make an evaluation of present status to determine what is necessary to meet the requirements of the directive. These evaluations should include resource requirements, cost, schedules, and identification of any other areas of program impact. It is requested that this office be informed of evaluation results within 30 days.


E. R. Mathews



Date: 14 June 1967

KSC APOLLO PROGRAM DIRECTIVE NO. 12

TO: Distribution

FROM:  Acting Apollo Program Manager, DA

SUBJECT: KSC Identification for Traceability

I. PURPOSE:

The purpose of this directive is to establish uniform requirements for the implementation of Identification for Traceability at KSC. These requirements will be in accordance with NHB 5300.1A Sect. 8, Apollo Program Identification for Traceability Requirements.

II. SCOPE:

This directive describes the Apollo Program requirements for and the applicability of Identification for Traceability at KSC. The principal functions and responsibilities of KSC organizations and related contractors are outlined. The requirements of this directive shall be implemented within the scope of KSC operation.

A. The KSC organizations involved in the implementation of this directive are:

1. Apollo Program Manager (DA)
2. Director, Quality Assurance (EA)
3. Director of Administration (GA)
4. Director of Launch Operations (HA)
5. Director of Design Engineering (MA)
6. Director of Technical Support (NA)
7. Director of Installation Support (RA)

B. Contractor and sub-contractor organizations involved are responsible for the implementation as identified in KSC contracts or task orders.

III. APPLICABILITY:

This program directive applies to mission essential ground support systems and equipment when:

- A. The equipment, if discrepant, will adversely affect the mission requirements.
- B. The equipment, when discrepant, can result in hazardous or unsafe conditions for using or maintenance personnel.
- C. The equipment is susceptible to failure or gradual degradation in its system application.
- D. The data accumulated during the life of the equipment are necessary for analysis to effect failure recurrence prevention or product improvement.

Not all material or components that are used to fabricate equipment in the above categories will be critical. In order to minimize the cost impact of this directive, KSC organizations or their contractors having design responsibility for the equipment shall determine what material or components shall be identified for traceability. This determination shall be made using the criteria of Section VI of this directive. The use of redundant components does not eliminate the requirement of identification for traceability. Two similar components containing non-conforming material are both subject to failure. When the components used to effect redundancy are of different design and only one component fails due to non-conforming material, the need to be able to take corrective action is evident.

The requirements of Identification for Traceability shall be applied (in accordance with the above criteria) to all new systems or equipment and to spare parts, modification kits, and refurbishment material for existing systems, when the design, procurement, or manufacturing is a direct responsibility of KSC.

Identification of new and existing equipment shall be in accordance with K-AM-03.

Existing equipment shall be identified to the level of assembly necessary to adequately allow for the new spares, modification kits, or refurbishment material, which is traceable, to be separated from old material which is not traceable. This separation is to be accomplished by the use of serial numbers. All equipment or material contracts released for manufacturing procurement 60 days after the issuance of this directive shall comply with this directive. Any noncompliance with this directive shall be brought to the attention of the KSC Apollo Program Manager (DA) in writing by the Reliability and Quality Assurance Program Office (DD).

IV. REFERENCE DOCUMENTS:

NPC 200-2	Quality Program Provisions for Space System Contractors, April 1962
NPC 250-1	Reliability Program Provisions for Space System Contractors, July 1963
NHB 5300.1A	Apollo Reliability and Quality Assurance Program Plan, July 1966
NPC 500-1	Apollo Configuration Management Manual, May 1964
K-AM-03	KSC Apollo/Saturn Configuration Management Plan, January 31, 1966

V. DEFINITIONS:

- A. Article: A unit of hardware or any portion thereof required by the contract. (SP-6001, NPC 200-2)
 - B. Assembly: A number of parts or subassemblies or any combination thereof joined together to perform a specific function.
 - C. Date Code: A number which indicates a specific date in code. A date code may consist of a series of numbers which indicate day, week, month, or year.
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- D. Degree of Traceability: The depth to which the retrievable records shall be capable of verifying the identity of an article or lot of articles.
 - E. Equipment: One or more assemblies, or a combination of items capable of performing a complete function. (SP-6001)
 - F. Identification (for Traceability): A controlled serial, lot number, date code, or combined serial and lot number or date code which relates the article, assembly, model or system to a particular lot of raw material, process, manufacturing data, cure date, receiving date, purchase lot, historical record, inspection or test data, calibration data, assembly process, matched articles, expiration date, operating time, x-ray or other pertinent data.
 - G. Lot Number: A number which identifies raw material or a group of articles which are produced concurrently and are identical in every respect.
 - H. Modification Kit: An item composed of a group of articles which is issued as a unit for accomplishing an alteration to an equipment.
 - I. Nonconformance: Any material, part or product in which one or more characteristics do not conform to the specified requirements.
 - J. Records: Include documented data and information relative to source control, procurement, stock, storage, manufacturing, process control, inspection, test and shipping.
 - K. Refurbishment Material: Raw material and semifabricated items used for renovation activities required to restore equipment or a facility to usable condition (e.g., that material used to renovate a launch pad after a launch, such as paint, hoses, electrical wire, protective coatings and lubricants).
 - L. Serial Number: A number which identifies individual articles, assemblies and equipment of the same part number.
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- M. Source Control Drawing: Identifies the Supplier and part number of a part tested and approved for use in specific equipment. Eliminates substitution of the item without prior testing and approvals. (Refer to MIL-STD-7, paragraph 3.24)
- N. Spare Part: An item capable of separate supply and replacement which is required for maintenance, overhaul, or repair of the article for which it was provisioned.
- O. Specification Control Drawing: Specifies the configuration design and test requirements for the item, designed and manufactured by suppliers. (Refer to MIL-STD-7, paragraph 3.24)
- P. System: One of the principal functioning entities comprising the project hardware and related operational services within a project or flight mission. Ordinarily, a system is the first major subdivision of project work. Similarly, a subsystem is a major functioning entity within a system. (A system may also be an organized and disciplined approach to accomplish a task, e.g., a failure reporting system.) (NPC 200-2, NPC 250-1)
- Q. Traceability: The ability to trace the history, application, use and location of an individual article or characteristic lot of articles, through use of recorded identification numbers.

VI. REQUIREMENTS:

A. Criteria for Application of Identification for Traceability

The following criteria have been established as minimum requirements for specifying that identification for traceability is required.

1. Where functionally matched sets of hardware, requiring selective fits or assembly, are used.
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2. When the control of in-process material, subject to time or cycle degradation, is used (i.e., bonding, adhesives, etc.).
3. When articles or assemblies require periodic maintenance, service or are subject to variation, degradation or replacement.
4. Where materials or articles are used in applications which approach the maximum or minimum design limits.
5. Where materials are used that are exotic, new or peculiar to their application.
6. When materials are used that require exacting processing or fabrication controls.
7. Where the recording and analysis of unique data is required for acceptance:
 - a) For controlling processing or machine operations.
 - b) For special environmental, acceptance or qualification testing.
 - c) When X-rays, non-destructive testing, etc., are used.
8. When identification for traceability is established on a lower level article, and this identification must be continued through to higher levels of assembly.

Additional criteria will be developed and applied, by the responsible design function, when the criticality of the material or articles is made significant through its design, function, application, or reliability and quality requirements.

B. Exempt Article List

A documented list of all articles that are determined to be exempt from identification for traceability will be established. Each listed article will have a numeric and generic description and the specific reason for exemption. This list will be approved by the Reliability and Quality Assurance Office (DD).

The articles on this list are exempt from identification for traceability only, not from the identification requirements of K-AM-03. Where an entire system is exempt from identification for traceability, the system specification shall so state. Where a system includes both exempt and non-exempt contract end items, the exempt CEI's shall be listed in the system specification. The list of exempt articles shall be included in all CEI's and lower-level specifications when the CEI is not totally exempt. Specifications are to be prepared in accordance with NPC 500-1 as interpreted by K-AM-03.

C. Introduction Points for Identification for Traceability

Determination of the specific introduction point for identification will be made by the responsible design engineering organization. Initial introduction decisions will be made during the design phase at the Preliminary Design Review (PDR), and will be evaluated again during the Critical Design Review (CDR). Additional identification may be introduced at any point in the manufacturing cycle, when problems are encountered.

For existing equipment, an exempt article list (reference paragraph B) will be prepared to be used for establishing the requirements for identification for traceability for spares to the existing equipment.

All decisions will be based on the application of established criteria during the detailed analysis of each individual component part and its related material.

The method of identification, the degree of traceability, the type and location of marking will be documented on specifications, engineering drawings and related documents. New requirements determined after design evaluation will be implemented through changes to the engineering drawing and other control documents. The changes will indicate the introduction point and the disposition of any articles which may be in-process.

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D. Maintenance of Identification for Traceability

Procedures will be developed, coordinated and documented to cover all phases of the Identification for Traceability program by the responsible operational and quality organizations. Procedures will be directed at transmitting the engineering drawing requirements to all levels of organization and contractors. Included as part of the procedures will be direction for inclusion of the identification for traceability requirements in incoming inspection and in test, in detailed manufacturing operation and quality assurance planning to include Identification for Traceability to fabrication/assembly, and transmission of requirements to contractors and sub-contractors including data, records and information transmission, retention and retrieval.

Procedures will also specify all requirements for material and lot control during the complete processing, manufacturing and acceptance cycle, and assure that all contractual requirements have been met. Traceability shall be demonstrated and verified at FACI.

E. Establish Standard Methods of Identification for Traceability

Standard methods of identification for traceability will be serial numbers, lot numbers or data codes or various combinations of these methods, dependent upon engineering drawing and implementing procedure requirements. These methods of identification will be used to identify individual articles, lots of material or articles, or dates of manufacture, on the articles and in records.

Numbers used for identification will be assigned or controlled in their usage by the responsible operation, contractor or sub-contractor, to ensure non-duplication in their assigned use. Each responsible function will indicate, in its procedures, its method of assignment and control. These procedures will be coordinated and approved by the responsible quality assurance organization.

F. Establish Supplier Requirements

Procedures will be developed, documented and established to ensure complete transmission of all identification for traceability requirements to contractors and sub-contractors. Procedures will include the data and records requirements for both retained and transmitted data.

These procedures will be developed and documented by the responsible quality assurance organization, and will be coordinated with the responsible purchasing organization for inclusion in the contract or task order.

A method of identifying each contractor and sub-contractor manufacturing location will be documented by the responsible quality assurance operation to ensure direct and rapid data and record retrieval capability.

G. Data, Records and Information Requirements

Develop, document and establish a complete data and records feedback system to meet the requirements of this policy. The data system must have the necessary continuity to ensure that required material, articles, assemblies and equipment can be traced rapidly through the record system:

1. Backward from the highest level of assembly down to the lowest level specified for introduction of identification for traceability and,
2. Forward to ensure the location of all like articles, at any point in the process, manufacturing cycle or equipment, to effect their timely removal.

Related data and records must be adequate to enable analysis of problems, related to identified articles, to ensure timely and effective corrective action.

The records system will have provisions for recording the identify of articles removed and show the identity of all replacements, to provide the required continuous record.

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The system will ensure the correlation and coordination of inspection, test, manufacturing, processing, assembly and other records to provide complete traceability of all selected materials and articles based on a complete and sequential information history.

The data system will contain the requirement of complete data and record retrieval and analysis within a maximum of 48 elapsed hours from the initial request for information.

Records and data retention periods will be determined from contract requirements, but in no case will it be less than three years from acceptance of hardware by the customer.

The responsible quality assurance organization will develop and coordinate the procedures required with all other responsible design engineering and operational organizations, including purchasing, contractors and sub-contractors.

H. Establish Receiving Verification and Conformance Criteria

Procedures will be established to provide direction for verification of data received with material and to ensure complete conformance by the contractor in meeting specified identification requirements. The procedure should specify the corrective action required and the disposition of the material when specified data is not received. Specific routing, feedback and storage of data received should also be specified. Reference documents and information should be listed and routing established to ensure its timely availability for use in determining conformance by the contractor.

The responsible quality assurance organization will review and approve all procedures for verification. Procedures will be established and documented by the quality organization related to the operation receiving and using the material.

I. Establish Contractor Conformance Audit

Develop, document and establish a contractor I/T conformance audit technique for field use to determine the degree of conformance to specified requirements. The audit will include the activities, requirements and conformance of sub-contractors to contractor requirements.

The audit technique should include all phases and functions performed during the complete procurement, manufacturing and acceptance cycle and include a method of ensuring availability of complete historical data and records. The disposition and control of non-conforming material and articles should be included as a part of the audit. This technique will be developed and documented by the responsible quality assurance organization for use by all quality personnel auditing contractors for KSC.

J. Establish Procedures for Non-Conforming Material Identification Control

Develop, document and establish procedures for the control of all rejected, reworked or scrapped material or articles which are identified for traceability. The procedure will include requirements for continuity of identification for all material requiring rework or rejected material processed through the Material Review Board (MRB) routine. The procedure will include directions for terminating all identification numbers on material or articles. All data relative to non-conforming material will be documented and become a part of the historical record. The responsible quality assurance organization will develop and coordinate this procedure to ensure the use of a uniform practice for all KSC including all MRB's.

VII. AUTHORITIES AND RESPONSIBILITIES

A. The Apollo Program Manager (DA) is responsible for:

1. Establishing KSC Identification for Traceability policy in accordance with the Apollo Program Identification for Traceability, NHB 5300.1A, Section 8.
2. Regular review and assessment of the effectiveness of the Identification for Traceability Program.
3. Assuring that the program is effectively coordinated within KSC and with other centers, commensurate with Integrated Operating Procedure agreements.
4. Directing the implementation of the Identification for Traceability Program and providing measurements of effectiveness.
5. Approving all exempt article lists prior to order placement or the start of manufacturing.

B. Director, Quality Assurance (EA) shall be responsible for:

1. Reviewing program requirements or procedures for the purpose of determining if they conform with existing center policy or identify the need for new center policy.
2. Monitoring line operational reliability, quality assurance, and inspection functions to assure adherence to center policy and procedures, and coordinating the findings with the Apollo Program Manager.

C. Director of Administration (GA) shall be responsible for:

1. Directing and coordinating the activities of the Procurement Office (GD) in the establishment of identification for traceability requirements as required in contracts, task orders, and negotiations with contractors, sub-contractors, and suppliers.
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2. Assuring that all contractual identification for traceability requirements including necessary contacts for surveillance purposes are coordinated with the Apollo Program Manager.

D. Director of Launch Operations (HA) shall be responsible for:

1. Implementing identification for traceability requirements within the operation and providing the data and records required.
2. Requesting analysis and traceability assistance in problem areas, including the related corrective action from quality assurance.
3. Requesting the implementation of additional identification for traceability requirements as it is indicated as a result of problem areas encountered.
4. Performing surveillance of quality assurance activities of contractors to determine conformance to identification for traceability requirements.

E. Director of Design Engineering (MA) shall be responsible for:

1. Applying existing criteria or determining additional criteria for implementing the identification for traceability to material, articles, assemblies, or equipment procured by KSC, with the exception of those systems under the responsibility of the Director of Information Systems.
 2. Documenting the identification for traceability requirements on the engineering drawing specifications and/or other related documents, to assure that all requirements are available for transmitting to the implementing functions as described in this policy.
 3. Documenting all material and articles exempt from identification for traceability and coordinating the list with the Reliability and Quality Assurance Office (DD) for approval.
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4. Introducing changes to the engineering data when problems are encountered that require the addition of identification for traceability either for control, analysis, or to obtain corrective action.
 5. Reviewing and acting on requests for identification for traceability from (EA), (RA), (HA), and (NA), and coordinating related changes with these functions.
 6. Coordinating and establishing identification for traceability requirements in contacts with the Corps of Engineers.
- F. Director of Technical Support (NA) shall be responsible for:
1. Applying existing criteria or determining additional criteria for implementing the identification for traceability to material, articles, assemblies, or equipment within the scope of the responsibility of the organization.
 2. Documenting the identification for traceability requirements on the engineering drawing specifications and/or other related documents, to assure that all requirements are available for transmitting to the implementing functions as described in this policy.
 3. Documenting all material and articles exempt from identification for traceability and coordinating the list with the Reliability and Quality Assurance Office (DD) for approval.
 4. Introducing changes to the engineering data when problems are encountered that require the addition of identification for traceability either for control, analysis, or to obtain corrective action.
 5. Reviewing and acting on requests for identification for traceability from (EA), (RA), and (HA), and coordinating related changes with these functions.
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6. Performing surveillance of quality assurance activities of support operations contractors to determine conformance to identifications for traceability requirements.
7. Coordinating efforts and initiating action for implementing additional identification for traceability requirements when requested by operations, contractors, or sub-contractors.
8. Assisting in the coordination and implementation of the identification for traceability data system, including data formats, inputs, outputs, and necessary reports for traceability effectiveness measurements.

G. Director of Installation Support (RA) shall be responsible for:

1. Performing all incoming inspection and test, verification of all identification for traceability records and accept or reject all material based on compliance to requirements.
 2. Assuring that all records and information are accurately transmitted for inclusion in the data system.
 3. Initiating and providing follow-up on all requests for records or information relating to tracing of material or articles and providing assurance that corrective action has been completed.
 4. Performing surveillance and quality evaluation audits of contractors and sub-contractors and internal KSC operations, to determine conformance to identification for traceability requirements.
 5. Reviewing, coordinating and approving all procedures and instructions for the implementation of I/T requirements for both KSC and contractors.
 6. Initiating action and coordinating efforts for implementing additional identification for traceability requirements when requested by operations, contractors or sub-contractors.
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